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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,725	06/26/2006	Yasuo Kitaoka	10873.1915USWO	6097

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HAMRE, SCHUMANN, MUELLER & LARSON P.C.
P.O. BOX 2902-0902
MINNEAPOLIS, MN 55402

EXAMINER	
SONG, MATTHEW J	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
04/14/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,725	KITAOKA ET AL.	
	Examiner	Art Unit	
	MATTHEW J. SONG	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 11 recites, "the alkaline-earth metal (other than Mg)" in line 3. It is unclear what the purpose of the parenthesis. In other words it is unclear whether the phrase in the parenthesis is optional or required. For the purpose of expediting examination, the claim is interpreted to not include the phrase "other than Mg" because claim 3 also contained the same phrase in parenthesis but was amended to specifically delete the phrase.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-6, 8-9 and 15-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeong et al (KR 10-2001-0000827), an English Translation (ET) is provided.

Jeong et al discloses a method of growing GaN monocrystal by melting where Na is a catalyst and mixing with gallium and a nitrogen gas (ET Claim 1 and Abstract), this reads on growing in a nitrogen containing atmosphere by reacting at least Ga with nitrogen in a melt that includes an alkali metal (Na). Jeong et al also discloses doping with Mg (ET claim 4).

Referring to claim 2, Jeong et al discloses doping with Mg.

Referring to claims 3 and 5, Jeong et al discloses doping with Mg, Sr or Ba, which are alkaline-earth metals. (ET claim 4).

Referring to claim 4, Jeong et al discloses nitrogen gas. (ET claim 1 and Abstract)

Referring to claim 6, Jeong et al discloses Na and Mg. (ET claim 1 and 4).

Referring to claim 8-9, Jeong et al discloses Ga and a GaN single crystal. (ET Abstract and claim 1).

Referring to claim 15-16, Jeong et al discloses the GaN can be used as a substrate and the substrate is doped with Mg (a p-type dopant) (ET paragraph 64).

Referring to claim 17, the recitation a field effect transistor has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Here, Jeong et al discloses the claimed GaN substrate may be used as a substrate for the production of opto-electronics and high power sink application; therefore meets

the structure limitations of the claim. A field effect transistor is merely reciting the purpose of the GaN substrate.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 7 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong et al (KR 10-2001-0000827), an English Translation (ET) is provided, as applied to claims 1-9 and 15-17 above, and further in view of Yoshida (US 6,534,801).

Jeong et al teaches all of the limitations of claim 7, as discussed previously, except the amount of Mg.

In a method of making a GaN device, note entire reference, Yoshida teaches a p-type impurity such as Mg is doped during the formation of an undoped GaN layer and setting the dope amount in the range of $2x10^{17}$ to $5x10^{16}$ cm^{-3} produces an electric resistivity of the GaN layer can be made $1x10^{6}$ Ω/cm^{2} or more (col 3, ln 35-60). Overlapping ranges are prima facie obvious (MPEP 2144.05). It is also noted that Yoshida teaches different units for resistivity (Ω/cm^{2} vs. Ω*cm), however Yoshida teaches resistivity is $1x10^{6}$ Ω/cm^{2} or **more** and a similar amount of dopant, as taught by applicant; therefore the resistivity is expected to be within the claimed range because similar materials are expected to have similar properties.

Yoshida teaches a relationship between the amount of dopant and the electrical resistivity of a GaN material, and adding a p-type dopant can compensate for lattice defects. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Jeong et al by optimizing the amount of Mg added to obtain the claimed amount by conducting routine experimentation because Mg dopant amount is taught by Yoshida to be a result effective variable, and the concentration of Mg is taught by Yoshida, which overlaps the claimed range is known to produce desirable electrical properties.

Referring to claims 10-11, the combination of Jeong et al and Yoshida teaches a concentration of Mg in the range of $2x10^{17}$ to $5x10^{16}$ cm^{-3} which overlaps the claimed range. ('801 col 3, ln 35-50). Overlapping ranges are prima facie obvious. (MPEP 2144.05).

Referring to claim 12, the combination of Jeong et al and Yoshida does not teach adding oxygen which clearly suggests an oxygen concentration of 0.

Referring to claim 13-14, the combination of Jeong et al and Yoshida teaches resistivity is $1x10^{6}$ Ω/cm^{2} or **more** and a similar amount of dopant, as taught by applicant; therefore the

resistivity is expected to be within the claimed range because similar materials are expected to have similar properties.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1792

MJS
April 9, 2008

/Robert M Kunemund/
Primary Examiner, Art Unit 1792